

Having thus described the invention, what is claimed is:

1. A sizing composition compatible with a phenolic pultrusion process comprising:

1 – 7 % of a film forming polymer;

0.5 – 3.0 % of a silane coupling agent;

0.5 – 3.0 % of a non-ionic lubricant;

0.2 – 3.5 % of a cationic lubricant; and

0 – 3 % of a water dispersible polyether based polyurethane solution.

2. The sizing composition of claim 1, wherein the film forming polymer is selected from the group consisting of acrylics, polyamides, polyesters, polyvinyl acetate, polyurethanes and phenolics.

3. The sizing composition of claim 1, wherein the non-ionic lubricant is a polyoxyalkylated polyalkylene glycol ester.

4. The sizing composition of claim 3, wherein the non-ionic lubricant is polyethylene glycol mono-oleate.

5. The sizing composition of claim 1, wherein the silane coupling agent is an organosilane.

6. The sizing composition of claim 5, wherein the silane coupling agent is selected from the group consisting of gamma-aminopropyltriethoxy silane, N-beta (aminoethyl) gamma-aminopropyltrimethoxy silane, vinyltrimethoxy silane, gamma-glycidoxypolypropyltrimethoxy silane and phenylaminopropyltrimethoxy silane.

7. The sizing composition of claim 1, wherein the cationic lubricant is a partially amidated polyalkylene imine.

8. The sizing composition of claim 7, wherein the partially amidated polyalkylene imine is a condensation reaction product of olyethylene imine with a fatty acid selected from the group consisting of pelargonic acid and caprylic acid.

9. The sizing composition of claim 1, wherein the sizing composition provides an increased compatibility between individual glass fibers and a matrix resin in a phenolic pultrusion process.

10. The sizing composition of claim 1, wherein the film forming polymer is a polyamide, the silane coupling agent is an organosilane, the non-ionic lubricant is a polyoxyalkylated polyalkylene glycol ester, and the cationic lubricant is a partially amidated polyalkylene imine.

11. A method of making a sizing composition compatible with a phenolic pultrusion process comprising:

admixing 1 – 7 % of a film forming polymer, 0.5 – 3.0 % of a silane coupling agent, 0.5 – 3.0 % of a non-ionic lubricant, 0.2 – 3.5 % of a cationic lubricant, and 0 – 3 % of a water dispersible polyether based polyurethane solution to form an admixture; and

agitating the admixture for a period of time sufficient to provide a homogenous composition.

12. The method of claim 11, wherein the film forming polymer is a polyamide, the silane coupling agent is an organosilane, the non-ionic lubricant is a polyoxyalkylated polyalkylene glycol ester, and the cationic lubricant is a partially amidated polyalkylene imine.

13. The method of claim 11, wherein the period of time sufficient to form an admixture is 5 – 10 minutes.

14. The method of claim 11, further comprising:

individually pre-mixing the film forming polymer, the silane coupling agent, the non-ionic lubricant, and the cationic lubricant in water to form a pre-mix of each of the film forming polymer, the silane coupling agent, the non-ionic lubricant, and the cationic lubricant.

15. The method of claim 14, wherein the pre-mix is maintained at a temperature of approximately 70 – 80 °F.

16. The method of claim 14, wherein the water is demineralized water.

17. A fiber product comprising at least one glass fiber coated with a sizing composition according to claim 1.

18. A method of forming a sized glass fiber comprising:

applying a sizing composition compatible with a phenolic pultrusion process to at least one glass fiber, the sizing composition including:

1 – 7 % of a film forming polymer;

0.5 – 3.0 % of a silane coupling agent;

0.5 – 3.0 % of a non-ionic lubricant;

0.2 – 3.5 % of a cationic lubricant;

0 – 3 % of a water dispersible polyether based polyurethane solution; and

drying the sizing composition onto the at least one fiber to form a sized glass fiber;

wherein the sizing composition provides an increased compatibility between individual glass fibers and a matrix resin in the phenolic pultrusion process.

19. The method of claim 18, wherein the film forming polymer is a polyamide, the silane coupling agent is an organosilane, the non-ionic lubricant is a polyoxyalkylated polyalkylene glycol ester, and the cationic lubricant is a partially amidated polyalkylene imine.

20. A dry sizing composition compatible with a phenolic pultrusion process comprising:

5 – 30 % solids content of a film forming polymer;

5 – 50 % solids content of a silane coupling agent;

20 – 70 % solids content of a non-ionic lubricant;

1 – 10 % solids content of a cationic lubricant; and

0 – 30 % solids content of a water dispersible polyether based polyurethane solution.

21. The dry sizing composition of claim 20, wherein the film forming polymer is a polyamide, the silane coupling agent is an organosilane, the non-ionic lubricant is a polyoxyalkylated polyalkylene glycol ester, and the cationic lubricant is a partially amidated polyalkylene imine.